

Agricultural Research Institute, Pusa

MEMORANDUM REGARDING
LEADING EUCALYPTS SUITABLE
FOR INDIA

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Memorandum regarding Leading Eucalypts suitable for India.

INTRODUCTION.

The fact that so much success has attended the tentative efforts put forth in various parts of India would seem to show that the time has come to take up the question of Eucalyptus cultivation on a much larger scale than has hitherto been attempted, and with perhaps a more careful and systematic consideration of the climatic conditions to which the different varieties are so particularly sensitive.

Large sums are now being expended by Government in fighting malaria by means of quinine and mosquito extermination, which, however necessary, offer so to say *no collateral benefits*, such as are undoubtedly to be looked for from the family of trees to which Australia is supposed to owe its immunity from malaria and its singular healthiness.

But apart from this are the valuable products in the shape of a hard and quick-growing timber, often attaining gigantic proportions in less than one-tenth of the time taken by most trees, besides its oil, kino, tannin, bark used for roofing and paper, and other products. One variety, the giant *Amygdalina*, is said to yield as much as 3 lbs. of oil per 100 lbs. of leaves, and also to be frost and snow resisting, and is thus especially suited for hill districts.

The blue gum (*E. Globulus*) which has been mostly tried in India is not suited to extremes of either heat or cold, but prefers a temperate climate. Hence its success in the Nilgiris. But because it has failed under unsuitable climatic conditions, and because for similar reasons the few other varieties so far tried, such as *Robusta*, *Tereticornis* and *Meliodora* have also sometimes failed, the conclusion has often been formed that Eucalypts are not suited to India.

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As a matter of fact, among the 140 known varieties, there are Eucalypts which are suited to every kind of climate from the ocean to the snow lines of the Himalayas.

Some will stand any amount of moisture and will drain pestilential swamps, and would probably revolutionize the climate of the Terai. Others can endure the most arid regions. Others again are seldom met with more than fifty miles from the sea.

I believe that it will be found almost invariably that, where there has been failure, it has been due to putting "Ahmad's turban on Mahmud's head".

The accompanying list does not pretend to be exhaustive, as many promising varieties were reluctantly omitted in order to concentrate attention for the present on those which seemed likely to give the most immediate and rapid results.

With a view to encouraging and popularizing the cultivation of the Eucalyptus, it is suggested :—

1. That nurseries should be established in as many places as possible for the cultivation and distribution of young plants of suitable varieties.
2. That the Forest, Canal and Railway Departments be encouraged to establish plantations.
3. That Agricultural Farms and Colleges, and District and Municipal Boards should have their special attention called to the matter.
4. That an Annual Arbour Day Celebration shall be fixed on a date suitable for each Province or locality, when this and other valuable varieties of trees may be planted by school children.
5. That the co-operation and assistance of the Press be invited.
6. That a Eucalyptus Association be formed for the purpose of pushing the cultivation of the Eucalyptus.
7. That special concessions and grants of land be made to persons, companies, societies, villages, or associations willing to establish at their own expense nurseries, groves, avenues, or plantations of Eucalyptus.

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SIMLA ;
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ALPHABETICAL LIST OF EUCALYPTS SUITABLE FOR INDIA.

1. Alpina.	13. Gomphoccephala.	24. Pilularis.
2. Amygdalina.	14. Goniocalyx.	25. Planchoniana.
3. Botryoides.	15. Gunnii.	26. Ravenetiana.
4. Calophylla.	16. Leucoxydon.	27. Resinifera.
5. Coccifera.	17. Macrorrhyncha.	28. Robusta.
6. Cornuta.	18. Maculata.	29. Rostrata.
7. Corymbosa.	19. Marginata.	30. Salubris.
8. Corynocalyx.	20. Miniata.	31. Siderophloia.
9. Diversicolor.	21. Obliqua.	32. Tetricornis.
10. Eugenioides.	22. Pauciflora.	33. Tessellaris.
11. Ficifolia.	23. Phoenicea.	34. Viminalis.
12. Globulus.		

EXPLANATORY NOTES REGARDING ABOVE VARIETIES.

1. **Alpina**.—Stands frost and snow, but of very slow growth, and when brought to warm regions, continues slow growing. Other kinds ascending Alpine heights, Gunnii, Pauciflora, Vernicosa, Coccifera, Urnigera and Amygdalina.

2. **Amygdalina**.—Giant Eucalyptus, or Wangara. Amongst the tallest trees of all the world; has been measured at over 400'. Unsurpassed for yield of oil from leaves. South and East humid districts of Victoria, ascending to 4,000' in Tasmania. Hardier than most Eucalypts, and able to stand cold; especially the *Coccifera* variety. Preferable to all for malarial regions.

Yields of oil per 1,000 lbs. of leaves:—

Viminalis,	7 oz.	Goniocalyx,	150 oz.
Melliodora,	7 „	Leucoxydon,	160 „
Rostrata,	15 „	Oleosa,	200 „
Obliqua,	80 „	Amygdalina,	500 „
Globulus,	120 „		

Mast-like straightness, and clear whiteness of stems. *Timber floats in water*, unlike most Eucalypts. Timber particularly good for *shingles, palings and rails*, but not very lasting underground, and not a superior fuel. Very good for splitting into palings.

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Other Eucalypts yield oil copiously, but being small do not give such a large supply of leaves : *e.g.*, *Salubris*, *Salmonophloia*, *Longicornis* and *Microcorys*. *Its only rival in height is the Karri of West Australia*. *E. Diversicolor*. *In irrigated ravines of cooler districts reaches greatest height*. In open and ridgy country often dwarfed, and known as "Peppermint" of Victoria and Tasmania, or "Messmate" of New South Wales.

3. Botryoides.—(Bastard Mahogany). Mostly following river courses and moist sandy districts, close to coast; shady and horizontal, dark green foliage gives a beautiful appearance; stems even reach 80' without branches, and 5' diameter. Can be used on *coast sands*. Bark persistent, wood light brown; timber excellent, durability underground doubtful.

4. Calophylla.—Tall, reaching 150'; rapid growth, umbrageous; wood excellent. Kino liquid exuded resembling treacle. Selling at £25 to £30 per ton. Not suited for frosty regions and even suffers from night frosts in Melbourne. Grows well in mild climates, and tropics, *e.g.*, Zanzibar.

5. Coccifera.—Variety of *Amygdalina*. Resists frost. There are two fine specimens growing in England; one in Norfolk, and the other at Powderham Castle, in Devonshire; have passed through severe winters with temperature plus 9 degrees Fahr., while *Globulus* perished at plus 20 degrees.

6. Cornuta.—Moderate size, exceptionally exceeding 100', adapted for poor soil; preferring humid location; thriving in moist tropics. Wood very heavy, sinking in water, even when thoroughly dried; hard and elastic wood; very valuable.

7. Corymbosa.—(Bloodwood). Dry ridges and hills, and ascending mountain elevations; maximum height 150'; often stunted. Bark persistent, rough. Wood easily worked upon when fresh, but very hard when dry; long lasting underground; not good for sawing or fuel; difficult to burn; full of Kino sap.

8. Corynocalyx.—(Sugar Eucalyptus). Cattle and sheep like its sweet foliage. One of the best timber Eucalypts for drought. Hot and arid regions, hence sent to Algeria. Reaches height of 120', and diameter of 5' to 6'; bole for timber up to 60'. Good for sleepers and fence posts.

9. Diversicolor.—(Karri). Equals *Amygdalina* in height ; grows best in humid forest valleys, near coast ; underground durability not proved.

10. Eugenioides.—Green and dense foliage ; grows mostly on elevated and poor table-lands, hilly and mountainous tracts, also on sandy lowlands. One of the stringy barks. Reaches height of 200'. Bark thick, and fibrous ; used for roofing and inner portion for mats, as well as packing paper. Wood pale, splits well into rails, slabs, shingles and palings ; of inferior value as fuel.

11. Ficifolia.—Ornamental ; red ; seldom 50' high ; good for Kino and tan.

12. Globulus.—(Blue Gum of Victoria and Tasmania). Very tall and rapid grower ; valleys, ridges, and on mountain slopes, chiefly in humid regions. Good results in Campagna near Rome for malaria. Bears considerable cold to 20 degrees Fahr. if not lasting long enough to congeal sap, and location dry ; if sheltered stands cold better. Not equal in hardness to *Amygdalina*, *Pauciflora* and *Gunnii*.

In quickness of growth, *Globulus*, *Corymbosa*, *Diversicolor* and *Obliqua* lead.

Timber gravity, 698-1108—2nd class ; giving way to *Rostrata* for sleepers and water. *Globulus* more apt to break than *Rostrata* where violent winds. Not suited for cold zones, but will change arid treeless regions, mitigate heat, etc., provided soil not sand and subsoil not impenetrable rock, etc. Excellent for forests and an excellent scavenger for backyards in Australia, the falling foliage being non-putrifying and antimalarial. Specially good for temperate regions of tropical mountains—*e.g.* Nilgiris. Of rapid growth, but soon retarded if subsoil not deep and friable ; if latter such, will grow in very poor soils, if not altogether dry ; averse to saline and lime soils. Surpasses all in early yield of fuel.

13. Gomphocephala.—(Tooart). Coast ; always in limestone formations ; tall, reaching 120' ; stem often clear to 50' ; bark persistent ; timber very heavy, 1st class, even stronger than oak. Suitable for mild climates and limestone country near coast.

14. Gonicalyx.—(Spotted Gum tree of Victoria). Leaves sometimes 1 foot long. Grows in low or hilly woodlands, up to about 3,000' ; also in rich forest valleys it reaches 300', with a stem diameter of 6' and

even 10'. Wood hard and tough; pale yellow to brown; lasting long underground and not warping; almost as difficult to split as *Rostrata*. Very good for railway ties. One of the most deserving Eucalypts for forest cultivation.

15. Gunnii.—(Swamp Gum or Cider Eucalyptus). Grows in alluvial or swampy flats; also moist forest hills. Can stand frost and snow. In dwarf form it grows up to 5,500' (Australia); usually not tall but rising occasionally to 250'. Foliage more dark and dense than most Eucalypts. Trees often grow crooked.

16. Leucoxydon.—(Iron Bark of Victoria, or White Gum of South Australia). Greater part of stem pale and smooth, but bark deciduous. Iron Bark growing on sandstone and stony ridges, retains bark deeply fissured and furrowed. Moderate height, up to 200'. One of the best Eucalypts for a *moist* tropical climate. Nectar juice of the flowers attracts bees. Specific gravity when air-dried from 1.110 to 1.024; always heavier than water.

17. Macrorrhyncha.—(Stringy Bark of Victoria). Not equal in height to *Obliqua* of South Australia and Tasmania, nor of such high elevations. Grows on sterile ridges and ranges, usually silurian. Wood easily fissile; good for fences, rails and shingles. Thick fibrous bark, persistent; when removed in large sheets, levelled and dried under pressure, extensively used for *roofing* will last 20 years. Gravity 1.020.

18. Maculata.—(Spotted) and *CITRIODORA* (Lemon-scented). Handsome, tall and moderately fast grower.

19. Marginata.—(Jarrah of West Australia). Averages 100 to 150'; diameter 6'; bole often 60'; bark persistent; not rapid growth. *Humid regions near coast*; avoids hot and dry tracts; seldom 50 miles from coast. Usually found on sandy land and iron stone rocks, and granite ranges. Said that white ants will not touch it, owing to astringent principle. Kino percentage equal to *Rostrata*, and more than others.

20. Miniata.—Moderate height, 70'; ornamental; like *Phoenicea*.

21. Obliqua.—(Stringy Bark of South Australia and Tasmania—Messmate of Victoria). Lofty, maximum height of 300'. Bark persistent. A dwarfed and shrubby mountain variety is found up to 4,000'. Dwarfed by cold. Timber fissile. Good for fences, rails, palings and shingles. Decays early underground. Bark used for roofs; also very suitable for paper, packing, printing and even writing paper, and mill and paste boards.

22. Pauciflora.—Can cope with severe frosts; up to 5,500' on Australian alps and near glaciers. Medium height up to 100'; from lowest hills to highest ridges and (dwarfed) to snow line. Timber soft; not suitable for underground; excellent fuel and good log fences.

23. Phoenicea.—Filaments scarlet; so named from fiery crimson plumage of phoenix. In ornamental splendour vies with *Ficifolia* and *Miniata*; small or middle-sized tree: good for ornamental purposes for any country free from frost. Bark very friable; something like *micaschist*; persistent, but easily detached.

24. Pilularis.—Grows in wooded country, near coast slopes. Maximum height 300' and circumference 35', but usually much less. Blackbutt tree. Bark is rough and persistent.

25. Planchoniana.—Arid, sandy and rocky ridges; height 100'; wood excellent; foliage massive; more shady than most Eucalypts.

26. Raveretiana.—(Grey Gum, or Iron Gum). Grows in *wet* forest valleys, or along shady streams; very tall, up to 300', and stem 10' diameter. Foliage almost completely deciduous. Flowers and fruits extremely small. Wood dark coloured; very hard and durable; good for sleepers and under-ground piles; flowers when only 10' high; foliage rich in volatile oil and is a powerful antiseptic. Suitable for *wet* tropical countries.

27. Resinifera.—(Kino Eucalyptus of New South Wales). Tall; along with *Rostrata* and *Cornuta*, should be amongst the most valuable for timber in wet tropics.

28. Robusta.—Flourishes in swampy lands near sea. Height 100'. Wood good for fuel, sleepers, posts, joists. Kino red, percentage 19' higher than *Rostrata* and *Marginata*, (16 and 17); pleasant odour.

29. Rostrata.—(Red Gum). River banks, alluvial valleys and desert oases where *water*. Not so fast growing as *Globulus*, nor so durable as *Marginata* (Jarrah of West Australia). Fine timber; insect resisting. Resists wet tropical heat, *e.g.*, Mauritius; good for sleepers and posts. Fresh bark 7 to 8 per cent. Kino; bark smooth, deciduous, or rough and permanent. Will live in even permanent shallow marshes.

30. Salubris.—(Gimlet or Fluted Gum tree of West Australia). Wood tough, yet easy to work on. Used for poles, shafts, wood engraving, etc. Extraordinary abundance of oil in foliage. From base of mountains to inland arid tracts; maximum height 120 to 150 feet. Leaves scattered on swamps arrest malaria.

31. Siderophloia.—(Iron Bark of New South Wales). Excellent timber; in height 150'; diameter 4'; bark persistent. Kino plentiful.

32. Tereticornis.—Resembles closely *Rostrata*. Never far from coast; usually on humid flats, swamps, lakes and water courses; never on saline ground.

33. Tessellaris.—Extends to Central Australia; dry localities, both ridges and flats; stands long continued hot winds with temperature 154 degrees Fahr. Reaches 150' in height, and 3' diameter. Wood elastic; not so durable as some, but easier worked.

34. Viminalis.—(Manna Eucalypt). Tall, reaching to 300'; stem diameter to 17'. Timber not equal to some, but stronger than *Amygdalina* and *Obliqua*. Used for rails and shingles. Uniform thickness to great height and very straight. Wood does not warp; inferior fuel; exudes Manna; sap rich in Saccharine.

GENERAL NOTES ON EUCALYPTS.

Order Myrtaceæ; tribe Leptospermæ; evergreen, rapid growth; bark, either persistent or outer layers deciduous; seeds numerous, but few fertile; latter usually dark brown, former pale brown and smaller. Next to *Acacia* for number of species; those known being more than 110 in number.

Height.—*Karri* (*Diversicolor*), *Amygdalina*, *Globulus*, *Rostrata*, *Jarrah* (*Marginata*), *Goniocalyx*, *Obliqua* (*Stringy Bark*), *Leucosylon* (*White Gum*), *Macrorrhyncha*, *Raveretiana*. *Resinifera*, *Corynocalyx*, *Maculata*, *Citriodora*, *Pauciflora*, *Corymbosa*, *Salubris*, *Pilularis*, *Botryoides*, *Planchoniana*, *Robusta*, *Siderophloia*, *Cornuta*, *Tessellaris*, *Eugenioides*, *Calophylla*, *Viminalis*.

Timber floats in water.—*Amygdalina*.

Cold Climates.—*Alpina*, *Coccifera*, *Amygdalina*, *Gunnii* and *Pauciflora*, *Globulus* (*fair*).

Temperate Climates.—*Globulus*, *Calophylla*.

Dry, Tropical Arid Climates.—*Corynocalyx* (*Sugar Gum*), *Planchoniana*, *Globulus*, *Tessellaris*, *Eugenioides*, *Salubris*, *Macrorrhyncha*, *Corymbosa*.

Wet Humid Tropics, near Coast.—*Marginata* (*Jarrah*), *Tereticornis*, *Diversicolor* (*Karri*), *Pilularis*, *Botryoides*.

Humid Tropics, Alluvial Mountains and Rivers.—Goniocalyx, Leucoxydon, Raveretiana, Resinifera, Rostrata, Amygdalina, Globulus, Cornuta.

Swamps.—Gunnii Robusta (near sea).

Ornamental.—Phoenixea, Miniata, Ficifolia.

Railway Sleepers. (Hard).—Marginata, Rostrata, Globulus, Corymbosa, Goniocalyx, Raveretiana, Corynocalyx, Rostrata, Gomphocephala, Robusta and Viminalis.

Fissile. (Shingles, Palings, etc.)—Amygdalina, Obliqua, Macrorrhyncha, Eugenioides.

Fuel.—Obliqua, Eugenioides, Globulus.

Oil (leaves).—Amygdalina, Oleosa, Leucoxydon, Goniocalyx, Globulus, Salubris and Obliqua.

Bark for Roofing, etc.—Obliqua, Eugenioides, Macrorrhyncha.

NOTES ON PLANTING EUCALYPTS.

In planting Eucalypts, well ripened seeds should be shallowly sown in open nursing garden, or in seed-boxes. When hand-high, should be transplanted to check downward growth of roots, and encourage lateral rootlets. When finally transplanted 1 to 3 feet high to permanent location, cool season, cloudy sky, and regular daily watering. After larger growth cannot be transplanted as easily as deciduous trees. Can be raised for transportation in bamboo tubes, one in each tube.

NOTES ON FELLING EUCALYPTS.

1. A mistake to ring, as wood becomes hardened through drying and liable to crack.

2. Time of felling, end of summer, when flow of sap least, and before heavy rains and cooler weather cause fresh flow of sap.

3. Owing to density cannot be seasoned in log; exposure will only season outer part; should be sawn when felled, removed to stacking shed and lightly covered with saw-dust to prevent splitting and too rapid evaporation of natural moisture. 3×2 requires three months, and 12×12 requires twelve months to dry.

4. Prevent too great a shock in fall by underwood. Where none, usual to plant before felling. In any case choose soft ground and avoid rock.

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